

REMARKS

Upon entry of this Amendment, claims 1-47 will be pending in this application. Claims 9-39 have been withdrawn from consideration.

Claim Objections

Claims 45-47 were objected to because of lack of antecedent basis for the term “said crystal surface.” Accordingly, Applicants have amended claims 45-47 to recite the phrase “said (111) surface of said Si crystal,” which is recited in the base claim 40. Therefore, Applicants respectfully request withdrawal of the objection to claims 45-47.

Claim Rejections – 35 U.S.C. § 103

Claims 1-5, 7 and 8 have been rejected under 35 U.S.C. § 103 (a) as being unpatentable over Ahn *et al.* (US Pat. No. 6,586,792) in view of Campbell, The Science and Engineering of Microelectronic Fabrication, pages 29-31. Applicants respectfully traverse this rejection for at least the following reasons.

The Office Action concedes that Ahn *et al.* fails to teach that the silicon oxide film is substantially defect free and Ahn *et al.* does not explicitly teach that the silicon oxide film containing Kr reduces current leakage and improves breakdown characteristics of the insulation film when formed on a (111) surface. Furthermore, the Office Action concedes that Ahn *et al.* does not teach a silicon substrate comprising (111) oriented crystals. The Office Action contends, however, that Campbell teaches a silicon wafer formed of a boule and having a (111) orientation and thus it would have been obvious to one of ordinary skill in the art to select a commercially available wafer with a (111) orientation since it is commonly used in the art for p-type and n-type wafers.

MPEP 2143.01 states that “The level of skill in the art cannot be relied upon to provide the suggestion to combine references.” *Al-Site Corp. v. VSI Int’l Inc.*, 174 F.3d 1308, 50 USPQ2d 1161 (Fed. Cir. 1999). Furthermore, “In determining the property of the Patent Office case for obviousness in the first instance, it is necessary to ascertain whether or not the reference teaching would appear to be sufficient for one of ordinary skill in the relevant art having the reference before him to make the proposed substitution, combination or other modification.” *In re Linter*, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

The Examiner relies on Campbell's disclosure to ascertain that it would have been obvious to use a wafer having a (111) surface. However, Campbell merely discloses a silicon crystal (111) and does not suggest that an insulation film can be formed on a (111) surface of the Si crystal. In addition, as conceded in the Office Action, Ahn *et al.* does not suggest that the gate insulation layer comprising silicon dioxide is formed on a (111) surface of an Si substrate. There is no motivation in either Ahn *et al.* or Campbell to form a silicon dioxide film containing Kr on a (111) surface of a silicon crystal.

Applicants respectfully submit that the Examiner's conclusion that it would have been obvious to use a wafer with a (111) orientation (as it is commonly used in the art for p-type and n-type wafers) and form an insulation film comprising a silicon dioxide film containing Kr on the wafer with the (111) orientation is based on improper hindsight reasoning while reading the Applicants specification.

Consequently, neither Ahn *et al.* nor Campbell, alone or in combination, disclose, teach or suggest the subject matter recited in claim 1.

Claim 3 recites, *inter-alia*, "wherein at least a part of said insulation film comprises a Si oxide film containing Kr, and a Kr concentration level decreases in said Si oxide film from a surface of said Si oxide film to an interface between said Si oxide film and said Si crystal."

Applicants respectfully submit that for at least the above reasons provided with respect to claim 1, neither Ahn *et al.* nor Campbell disclose, teach or suggest, alone or in combination, the subject matter recited in claim 3. Furthermore, as conceded in the Office Action, Ahn *et al.* does not teach a device wherein the Kr concentration decreases from a surface of the silicon oxide to an interface between the oxide and the crystal.

The Office Action inference that the method of forming silicon dioxide of Ahn *et al.* would have inherently resulted in a Kr concentration that decreases from a surface of the silicon dioxide to an interface between the oxide and the crystal is clearly based on an improper hindsight reasoning while reading Applicants specification because there is no suggestion in Ahn *et al.* that the concentration of Kr would decrease as recited in claim 3. Moreover, Applicants submit that, Per MPEP 2112, "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999).

Consequently, Applicants submit that neither Ahn *et al.* nor Campbell, alone or in combination, disclose, teach or suggest the subject matter recited in claim 3.

Claim 40 recites, *inter-alia*, “wherein at least a part of said insulation film comprises a Si oxide film containing Kr, wherein said Kr reduces current leakage and improves breakdown characteristics of said insulation film when formed on said (111) surface of said Si crystal.”

For at least the above reasons provided with respect to claim 1, neither Ahn *et al.* nor Campbell, alone or in combination, disclose, teach or suggest the subject matter recited in claim 40. Furthermore, as conceded in the Office Action, Ahn *et al.* does not disclose the oxide film containing Kr reduces leakage and improves breakdown characteristics of the insulation film when formed on a (111) surface. The Office Action contention that the silicon oxide containing Kr would have inherently performed the same function is clearly based on an improper hindsight reasoning while reading Applicants specification because there is no suggestion in Ahn *et al.* that the insulation film can be formed on a (111) surface.

Therefore Applicants respectfully submit that claims 1, 3 and 40 are patentable and respectfully request that the rejection of claims 1, 3 and 40 under § 103(a) be withdrawn.

Claims 2, 4, 5, 7, 8, 41-44, 46 and 47 depend from either claim 1 or claim 40. Therefore, for at least the reasons presented above with regard to claims 1 and 40, claims 2, 4, 5, 7, 8, 41-44, 46 and 47 are patentable.

Furthermore, with regard to claims 5 and 44, contrary to the Office Action contention, the gate layer 20, in Ahn *et al.*, is simply deposited on weak-ferroelectric layer 18 and not on the gate insulation layer (silicon dioxide layer) 14. In contrast, claims 5 and 44 recite, *inter-alia*, “a gate electrode on said Si oxide film.”

Therefore, Applicants respectfully request that the rejection of claims 2, 4, 5, 7, 8, 41-44, 46 and 47 under § 103(a) be withdrawn.

Claims 6 and 45 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Ahn *et al.* (US Pat. No. 6,586,792) in view of Campbell, The Science and Engineering of Microelectronic Fabrication, pages 29-31 and further in view of Campbell, pages 394-396. Applicants respectfully traverse this rejection for at least the following reasons.

Claims 6 and 45 depend from either claim 1 or claim 40. Therefore, for at least the reasons provided above with regard to claim 1 and claim 40, claims 6 and 46 are patentable.

Therefore, Applicants respectfully request that the rejection of claim 6 and 46 under § 103(a) be withdrawn.

CONCLUSION

In view of the foregoing, the claims are now in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

Respectfully submitted,

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